

MIDS™ INFRARED TECHNOLOGY - EFFECTIVE, BENIGN, AFFORDABLE

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When I introduced the MITECH Infrared Dryer Sterilizer technology (MIDS™) at the Bunts and Smuts in Wheat Symposium in Raleigh, NC, August 17-20, 1997, it was suggested to me that I should go to San Diego and talk about MIDS™ at the Methyl Bromide Alternatives Outreach Conference. The achievement up-to-date for MIDS™ with methyl bromide is that MIDS™ killed *Tilletia indica* teliospores (Karnal bunt of wheat) in 10 seconds, while it took 96 hours for methyl bromide to kill the same pathogen.

Karnal bunt is an internationally regulated disease and one of the hardest-to-kill pathogens affecting agricultural products. MIDS™ was tested to determine if it could kill Karnal bunt yet not appreciably affect flour quality.

MIDS™ is the infrared (IR) equivalent to microwave technology. MIDS™ uses specific IR frequencies targeted to the molecular level. That makes the energy transfer more effective and the treatment cycle shorter. MIDS™ has no toxicity or radioactivity. It is environmentally safe and at the same time cost effective.

Tilletia indica teliospores (Karnal bunt) inside infected wheat seeds were used for all experiments. The experiments were performed at USDA, ARS, Foreign Disease-Weed Science Research Unit, Fort Detrick, Frederick, Maryland and applied approved laboratory practices using MIDS™ to kill *T. indica* teliospores inside unbroken seed coats of wheat. The seed germination process was done at Kansas Crop Improvement Association. The mixograph process was done at USDA, ARS, Hard Red Spring and Durum Wheat Quality Laboratory, Fargo, North Dakota. The mixograph test is a laboratory procedure to measure wheat quality for bread and pasta.

The results showed a substantial reduction of *T. indica* growth after 5 seconds and complete kill of *T. indica* after 10, 15 and 20 seconds. These studies showed MIDS™ to kill *T. indica* inside unbroken seed coats. After 5 seconds of MIDS™ treatment there was a reduction in seed germination of 5.33%, which is acceptable for plant seed quality. After 10 seconds of MIDS™ treatment there was a reduction in seed germination of 36.68%. The mixogram pattern for the control sample was similar to the mixogram patterns for the 5 second and 10 second treatments, confirming little or no effect on flour quality. The mixograph results showed acceptable quality for baking and pasta making. Continued studies are underway working with USDA ARS to prevent any reduction in seed germination. We anticipate that it will be possible to decrease the effect on seed germination, thus maintaining the quality of the plant seed and still kill the pathogen.

MIDS™ (10 seconds) performed faster than treatments with sodium hypochlorite (15 minutes), dry heat convection Oven (48 minutes) and methyl bromide (96 hours).

The study showed MIDS™ to be a very effective and promising non-toxic alternative to methyl bromide and other toxic treatments. Because MIDS™ was able to kill *T. indica* in 10 seconds, we anticipate that MIDS™ is able to kill most other pathogens in less time.

We anticipate that MIDS™ can be used for postharvest and structural applications including to eradicate Karnal bunt inside infected wheat seeds, and legitimize the certification of wheat as *T. indica* free. We believe it also will eradicate other pests and pathogens in seeds, grains, fruits, vegetables and as a greatly improved alternative to ultra violet treatments.

We are here to inform about MIDS™ and look for strategic partners with whom to explore the feasibility of MIDS™ as a methyl bromide alternative treating harvested crops, soil, and pathogen contaminated facilities and equipment.